DEVELOPMENT OF EDUCATIONAL DISPLAYS AND WEBPAGES ON PALEOSEISMOLOGY AND EARTHQUAKE HAZARD OF THE NEW MADRID SEISMIC ZONE

Annual Project Summary

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Martitia P. Tuttle
M. Tuttle & Associates
128 Tibbetts Lane
Georgetown, ME 04548
Tel: 207-371-2796
e-mail: mptuttle@earthlink.net

NEHRP Element: I (National and Regional Earthquake Hazard Assessment)

Key Words: Education, Information Transfer, Paleoseismology

Investigations Undertaken

Paleoseismology has greatly improved understanding of the earthquake history and potential of the New Madrid seismic zone. Studies of earthquake-induced liquefaction features, in particular, have led to development of an earthquake chronology and estimation of recurrence intervals for large New Madrid earthquakes. These results have been incorporated into the 2002 National Seismic Hazard Maps, which are affecting building codes and insurance rates. Yet, these results have affected few changes in local communities that could reduce their risk from New Madrid earthquakes. Although a few new structures have been designed to withstand strong ground shaking, almost nothing has been done to reinforce old structures or to remove unnecessary hazards in the building stock.

The primary goal of this project is to transfer information on the hazard presented by the New Madrid seismic zone to local residents who can play an important role in reducing the risk from future earthquakes. The information transfer will be accomplished through the development and production of educational displays and webpages on paleoseismology and earthquake hazard. The displays will be exhibited at several libraries, museums, and parks in the region and will reference the webpages. The webpages will include additional information and links to other related sites.

Tasks accomplished during the 2004 project period include (1) visits to Blytheville Public Library, Chuckalissa, New Madrid Historical Museum, and Sikeston Public Library and meetings with the directors of those facilities, (2) selection and editing of earthquake information to be included in the webpages, and (3) design and construction of the webpages. The webpages will soon be reviewed by Michelle Dry, the Educational Resources Manager for the Center for Earthquake Research and Information (CERI) at the University of Memphis, and Buddy Schweig, the Coordinator of the U.S. Geological Survey's Earthquake Hazard Reduction Program in the Central and Eastern United States. Once the webpages are reviewed, revised, and online, displays tailored to each community will be made for each facility.

Results of Investigations

During the 2004 project period, the Principal Investigator, M. Tuttle, visited Blytheville Public Library, Chuckalissa, New Madrid Historical Museum, and Sikeston Public Library and met with the directors of those facilities. The Blytheville and Sikeston libraries were selected for displays because they are two of the largest libraries in the region and service surrounding towns as well as the small cities where they are located. About 100,000 people visit the Blytheville library every year and elementary and high school students routinely use the library. About 17,000 people use the Sikeston library annually and it hosts numerous programs including family night. Chuckalissa is a popular archeological museum located in Memphis. It was chosen because of its location in the largest city of the New Madrid region and because archeology has played an important role in dating of liquefaction features and prehistoric earthquakes. The museum hosts tours and special events for the public including the annual Choctaw Indian Heritage Festival. The New Madrid museum receives about 9,000 visitors per year, representing all 50 states and about 23 foreign countries. Many of the visitors to the museum come because

of their interest in the New Madrid earthquakes. The museum hosts groups from colleges as well as elementary and high schools. We also have plans to erect an outdoor display at Big Oak/Towosahgy State Park but the Park Manager there transferred to a different park and has not yet been replaced.

During visits to the libraries and museums, the goal of the project was discussed with the various facility directors who all had good ideas about how to solicit as broad a local audience as possible. For example, Jo Ziolko of the Blytheville Public Library suggested that key science teachers in the local high school and community college be contacted regarding the opening of the display at the library. Suzanne Tangeman of the Sikeston Public Library suggested a public talk during evening hours. All the directors have offered to provide names and phone numbers of teachers, newspaper reporters, and other community leaders who could be contacted regarding the displays. Also during the visits, the display spaces in the facilities were considered and measurements made for the displays.

Materials on paleoseismology and earthquake hazard of the New Madrid seismic zone have been selected and edited for inclusion in the webpages. The webpages cover the following topics:

(1) The New Madrid Seismic Zone
(2) Geology of the New Madrid Seismic Zone
(3) Paleoseismology or Earthquake Geology
(4) Earthquake-Induced Liquefaction
(5) Paleoseismology of the New Madrid Seismic Zone
(6) Archeology
(7) Radiocarbon Dating
(8) Selecting Samples for Dating Liquefaction Features
(9) Seismic Hazard Maps
(10) Bibliography

The paleoseismology and earthquake hazard webpages have been designed and constructed by C. Moseley using HTML 4.0.1 with Macromedia Dreamweaver 4. The pages are simply structured and file sizes kept small to ensure ease of access for all internet users, independent of platform, browser, and connection speed. The text is well illustrated with maps, figures and photographs and PDF files of the illustrations are available for downloading. The webpages provide links to other sites on related topics such as seismicity of the New Madrid region, the National Seismic Hazard Maps, the U.S. Geological Survey's National Earthquake Hazard Reduction Program, information for K-12 students on earthquakes and earth science, and earth science curriculum for K-12 teachers. Initially the webpages will be hosted through M. Tuttle & Associates' Earthlink account. Prior to the end of the project, the webpages will be duplicated and thereafter hosted on the Public Earthquake Resource Center (PERC) website at CERI.

Recent Related Publications

Atwater, B.F., Tuttle, M.P., Schweig, E., Rubin, C.M., Yamaguchi, D.K., and Hemphill-Haley, E., 2003, Earthquake history from paleoseismology, *in* Gillespie A., Atwater B.F., eds., The Quaternary of the United States, International Union of Quaternary Scientists (INQUA) review volume: Elsevier, p. 331-350.

Tuttle, M. P., 2001, The use of liquefaction features in paleoseismology: Lessons learned in the New Madrid seismic zone, central United States, Journal of Seismology, v. *5*, p. 361-380.

Tuttle, M. P., Schweig, E. S., Sims, J. D., Lafferty, R. H., Wolf, L. W., and Haynes, M. L., 2002, The earthquake potential of the New Madrid seismic zone, Bulletin of the Seismological Society of America, v. 92, n. 6, p. 2080-2089.

Tuttle, M. P., Schweig, E., Campbell, J., Thomas, P. M., Sims, J. D., and Lafferty, R. H., 2004, Evidence for New Madrid earthquakes in A.D. 300 and 2350 B.C. at the Burkett archeological site, Seismological Research Letters, *submitted*.

Contact Information and Data Availability

Dr. Martitia P. Tuttle, Telephone: 207-371-2796, email: mptuttle@earthlink.net.

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Non-Technical Summary

Educational displays and webpages are being developed and produced as a means to transfer information on paleoseismology and earthquake hazard of the New Madrid seismic zone to local residents who can play an important role in reducing risks from future earthquakes. The displays are tailored to local communities, feature local studies, and will be exhibited in several libraries, museums, and parks across the New Madrid region. The webpages provide more detailed information than the displays and make the information available to national and international audiences as well as to New Madrid residents.